PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Jianbo Lu

Serial No.: 10/735,133 Group Art Unit: 3661

Filed: December 12, 2003 Examiner: Beaulieu, Yonel

For: ROLL STABILITY CONTROL SYSTEM FOR AN AUTOMOTIVE VEHICLE USING COORDINATED CONTROL OF ANI-ROLL BAR AND BRAKES

Attorney Docket No.: 8109304

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Appeal Brief-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on

November 3, 2006 (Date of Deposit) Jo Anne Croskey

Jo Anne Croskey (Signature)

APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The following appeal brief is submitted pursuant to the Notice of Appeal filed August 11, 2006, in the above-identified application.

I. Real Party in Interest

The real party in interest in this matter is Ford Global Technologies, LLC, which is a wholly owned subsidiary of Ford Motor Company both in Dearborn, Michigan (hereinafter "Ford").

II. Related Appeals and Interferences

There are no other known appeals or interferences, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status Of The Claims

Claims 1-5, 7-12, 14, 15 and 17 are currently pending and stand under final rejection, from which this appeal is taken. Claims 19-21 are allowed. Claims 6, 13, 16 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

IV. Status Of Amendments

There have been no amendments filed prior to or subsequent to the final rejection.

V. Summary Of Claimed Subject Matter

The present invention is directed to rollover events and the prevention thereof. The present invention provides a combined and coordinated control of active anti-roll bar and active brake systems to achieve rollover prevention performance. A controller is coupled to a plurality of sensors sensing the dynamic conditions of a vehicle. The controller generates a roll angle attitude signal indicative of a rollover or a potential rollover. The generated signal is used to control the active anti-roll bar system and brake system in order to counteract rollover in a vehicle.

Independent claims 1, 8, 12 and 15 are best described with reference to Figures 3, 5 and 6 and require determination of a roll attitude signal indicative of an impending rollover of the vehicle. Each independent claim requires the controller (26) to control the active anti-roll bar system (62) and the brake system (60) in response to the roll attitude signal in order to prevent an impending rollover of the vehicle (10). See paragraphs [0041]-[0053] in particular.

VI. Grounds of Rejection to be Reviewed on Appeal

The following issue is presented in this appeal, which corresponds directly to the Examiner's final ground for rejection in the final Office Action dated June 15, 2006:

(1) Whether claims 1-5, 7-12, 14-15 and 17 are anticipated by U.S. Patent No. 4,886,291 to Okamoto under 35 U.S.C. § 102(b).

VII. Argument

The Examiner asserted that claims 1-5, 7-12, 14, 15 and 17 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,886,291 to Okamoto, hereinafter, Okamoto. It is respectfully asserted that Okamoto fails to teach or suggest each and every element of independent claims 1, 8, 12 and 15.

(a) Claim 1

Independent claim 1 of the present invention requires:

an active anti-roll bar system;

a rollover sensing system generating a roll attitude signal indicative of an impending rollover of the vehicle; and

a controller coupled to the active anti-roll bar system and the rollover sensing system, said controller controlling the active anti-roll bar to prevent the vehicle from rolling over in response to the roll attitude signal.

The Okamoto reference fails to disclose a rollover sensing system as claimed in the present invention. The Okamoto reference fails to disclose the generation of a rollover attitude signal derived from the rollover sensing system. Therefore, it is respectfully asserted that the Okamoto reference cannot possibly teach or disclose that the controller controls the active anti-roll bar to prevent the vehicle from rolling over in response to the roll attitude signal that is generated by the rollover sensing system.

The Examiner asserted that the Okamoto reference teaches a rollover sensing system at column 4, lines 4-18. However, it is respectfully asserted that the Okamoto does not disclose a rollover sensing system but in fact discloses a suspension control system that stiffens the suspension to improve ride comfort in response to steering variations and vehicle speed.

The Okamoto reference discloses suppressing motion of a vehicle's suspension system based on steering angle, vehicle speed and road conditions. Referring to the steering angle aspect, Okamoto discloses anticipating vehicle rolling magnitude on the basis of a detected steering angle. Vehicle rolling magnitude is a measurement of vehicular roll in a vehicle's suspension and is also known as body roll motion. It is respectfully asserted that this motion is not the same as "rollover" in the present invention and that there is a significant difference between "body roll motion" and "rollover" as the terms relate to a vehicle in operation. Body roll motion is experienced during normal operating conditions of a vehicle. Body roll is a rolling motion experienced in the vehicle's suspension that is a result of steering, accelerating, or braking a vehicle. Rollover is experienced when large roll angles or lateral slip angles are experienced by a vehicle that could result in the vehicle physically rolling over, i.e. the tires leaving the road surface. Another distinction is that the movement associated with body roll motion is always occurring while a vehicle is in operation. In stark contrast, rollover or an impending rollover only occurs under certain conditions. Okamoto discloses monitoring the steering wheel angle and vehicle speed for the express purpose of stiffening the suspension of the vehicle to adjust the comfort level of the ride. Okamoto does not disclose a rollover sensing system that generates a roll attitude signal indicative of an impending rollover as claimed by the present invention.

Further support for this explanation of the difference between body roll motion and rollover is supported by the fact that detecting an impending rollover requires sensing of angles other than steering wheel angle, vehicle speed and road conditions. The fact that Okamoto does not disclose determining roll angle or slip angle, which are used to detect rollover or an impending rollover highlights this distinction of terminology between Okamoto and the present invention. It is respectfully asserted that detection of steering wheel angle and vehicle speed as disclosed in Okamoto are not in and of themselves indicative of rollover or of an impending rollover, see paragraphs [0012]-[0013] in the specification of the present invention. An impending rollover is determined by "roll angle", "slip angle" and "attitude", none of which are disclosed, taught, or suggested in the Okamoto reference. At paragraph [0044] of the specification, the rollover detector and roll angle computation is described. In addition

to sensors detecting vehicle speed, steering angle, etc., the detector utilizes roll angle computation and applies a rollover control law to generate a roll moment of the vehicle. It is respectfully asserted that the Okamoto reference fails to disclose a rollover sensing system, and therefore cannot possibly disclose generating a roll attitude signal derived from the rollover sensing system.

The Examiner also asserted that the Okamoto reference discloses the controller controls the active anti-roll bar to prevent the vehicle from rolling over in response to the roll attitude signal that is derived from the rollover sensing system. However it has been respectfully asserted that the Okamoto reference does not disclose generating a roll attitude signal and merely discloses control of the vehicle's suspension in response to steering variations. The control of the vehicle suspension disclosed in Okamoto is not related to rollover or impending rollover of a vehicle. The controller in Okamoto teaches control of a function that is different from the controller's function in the present invention. Therefore it is respectfully asserted that the Okamoto reference does not disclose controlling the active anti-roll bar system to prevent the vehicle from rollover in response to the roll attitude signal that is derived from the rollover sensing system of the present invention.

(b) Claims 8 and 12

Independent claims 8 and 12 require determining a roll attitude signal indicative of an impending rollover of a vehicle and controlling the active anti-roll system in response to the roll attitude signal, see paragraph [0044] of the present invention. Furthermore, claim 12 requires threshold testing the roll attitude signal for controlling the active anti-roll system and is described beginning at paragraph [0061] with reference to Figure 7. It has been respectfully asserted that Okamoto does not disclose determining a roll attitude signal that is indicative of an impending rollover as claimed in the present invention. Therefore it cannot possibly disclose threshold testing of the roll attitude signal.

Roll attitude determination as claimed by the present invention has been discussed in detail above. The Examiner relies on the brake switch (106) disclosed in the Okamoto reference as disclosure of the determination of a roll attitude signal as claimed

in claims 8 and 12 of the present invention. It is respectfully asserted that the disclosure of a brake switch does not imply threshold evaluation of a determined roll attitude signal and that the Examiner is improperly using hindsight reasoning to reach this conclusion.

Applicant is aware that hindsight reasoning is proper so long as it takes into account knowledge that is within the level of ordinary skill at the time the invention was made and does not include knowledge gleaned from the Applicant's disclosure. However, the Examiner does not provide factual findings, concrete evidence or technical reasoning to support the view that the brake switch disclosed in Okamoto discloses the claimed limitation of the present invention. The present invention claims controlling the anti-roll bar system and the brake system in response to the roll attitude signal generated as being indicative of an impending rollover. The Examiner is asserting that a brake switch operated in response to a road sensor, as disclosed in Okamoto, is equivalent to controlling the active anti-roll bar system and the brake system using a threshold test of the determined roll attitude system claimed in the present invention. It is respectfully asserted that the brake switch in Okamoto does not disclose, or even suggest, the controller controlling the active anti-roll bar to prevent the vehicle from rolling over in response to the roll attitude signal being between a first and second threshold and controlling the brake system to reduce a rolling moment of the vehicle based on tire force vector as claimed in the present invention. Therefore, it is respectfully asserted that claims 8 and 12 are not anticipated by the Okamoto reference.

(c) Claim 15

Independent claim 15 requires determining a roll angle estimate in response to roll sensing system sensors, controlling a front and rear active anti-roll bar in response to the roll angle estimate, and controlling a front and rear brake controller in response to the relative roll angle estimate to provide a predetermined tire force vector, see paragraph [0059] and again at paragraph [0065]. It is respectfully asserted that Okamoto does not disclose a predetermined tire force vector. Therefore, it is respectfully asserted that Okamoto cannot possibly disclose controlling a front and rear

brake controller in response to the relative roll angle estimate to provide a predetermined tire force vector as claimed in the present invention.

The Examiner asserted that columns 3 and 4 provide support for such disclosure. However, it is respectfully asserted that the Okamoto reference describes controlling dampening of the suspension and uses road sensors. So while road sensors are discussed at columns 3 and 4 in Okamoto, it does not disclose the determination of a tire force vector as claimed in the present invention. In fact, the term "tire" is not used anywhere in the Okamoto reference. It should also be noted that "tire" and "wheel" are not interchangeable terms.

VIII. Claims Appendix

A copy of the claims in this application, namely claims 1-21, is attached hereto as a Claims Appendix.

IX. Evidence Appendix

None.

X. Related Proceedings Appendix

None.

XI. Conclusion

For the reasons advanced above, Appellants respectfully contend that each claim including claims 2-5, 7, 9-11, 14 and 17 that depend from claims 1, 8, 12, and 15 are patentable and in condition for allowance. Therefore, reversal of the rejection and allowance of the claims is requested.

Respectfully submitted,

Angela M. Brunetti

Angela M. Brunetti
Registration No. 41,647

Attorney for Assignee

Dated: November 3, 2006

CLAIMS APPENDIX

What is claimed is:

1. A roll stability control system for an automotive vehicle comprising:

an active anti-roll bar system;

a rollover sensing system generating a roll attitude signal indicative of an impending rollover of the vehicle; and

a controller coupled to the active anti-roll bar system and the rollover sensing system, said controller controlling the active anti-roll bar to prevent the vehicle from rolling over in response to the roll attitude signal.

2. A roll stability control system as recited in claim 1 further comprising a brake actuator coupled to the controller, said controller controlling the active anti-roll bar system and the brake actuator to prevent the vehicle from rolling over.

3. A roll stability control system as recited in claim 1 wherein the active anti-roll bar system comprises a front active anti-roll bar.

4. A roll stability control system as recited in claim 1 wherein the active anti-roll bar system comprises a rear active anti-roll bar.

5. A roll stability control system as recited in claim 1 wherein the active anti-roll bar system comprises a front active anti-roll bar and a rear anti-roll bar.

6. A roll stability control system as recited in claim 1 wherein said rollover sensing system comprises a speed sensor, a lateral acceleration sensor, a roll rate sensor, and a yaw rate sensor.

7. A stability control system as recited in claim 1 wherein said controller changes a tire force vector by coordinately changing a roll angle through said active anti-roll bar system, and changing the front brake pressure and the rear brake pressure.

8. A method of operating a roll stability control system for an automotive vehicle having an active anti-roll bar comprising:

determining a roll attitude signal indicative of an impending rollover of the vehicle; and

controlling the active anti-roll bar system to prevent the vehicle from rolling over in response to the roll attitude signal.

9. A method as recited in claim 8 wherein controlling comprises controlling the active anti-roll bar and a brake system to prevent the vehicle from rolling over in response to the roll attitude signal.

10. A method as recited in claim 8 wherein controlling comprises controlling a front or rear anti-roll bar.

11. A method as recited in claim 8 wherein controlling comprises controlling a front and rear anti-roll bar.

12. A method of operating a roll stability control system for an automotive vehicle having an active anti-roll bar and a brake system comprising:

determining a roll attitude signal indicative of an impending rollover of the vehicle;

when the roll attitude is between a first and second threshold, controlling the active anti-roll bar system to reduce a rolling moment of the vehicle; and

when the roll attitude is above a second threshold, controlling the active anti-roll bar system and the brake system to reduce a rolling moment of the vehicle.

13. A method as recited in claim 12 further comprising determining a wheel lifted condition indicative of a lifted wheel, wherein when the roll attitude is between a first and second threshold, controlling the active anti-roll bar system to reduce a rolling moment of the vehicle comprises when the roll attitude is between a first and second threshold and a wheel lifted condition exists, controlling the active anti-roll bar system to reduce a rolling moment of the vehicle.

14. A method as recited in claim 12 further comprising when the roll attitude is between said second threshold and a third threshold, said third threshold being less than the second threshold, controlling a brake system alone to reduce a rolling moment of the vehicle.

15. A method of controlling roll stability of an automotive vehicle having a front and rear brake system, and a front and rear active anti-roll bar system comprising the steps of:

determining a roll angle estimate in response to roll sensing system sensors;

controlling a front and rear active anti-roll bar in response to the roll angle estimate; and

controlling a front and rear brake controller in response to the relative roll angle estimate to provide a predetermined tire force vector.

16. A method as recited in claim 15 wherein determining a roll angle estimate comprises:

determining a yaw rate for the vehicle;

determining a roll rate for the vehicle;

determining a lateral acceleration for the vehicle;

determining vehicle speed.

17. A method as recited in claim 15 wherein the step of controlling comprises the steps of determining a roll moment distribution from a brake system and from an active anti-roll bar system.

18. A method as recited in claim 15 wherein the automotive vehicle comprises an antilock brake system generating an antilock brake signal and a traction control system generating a traction control signal, and further comprising the steps of generating a brake actuator signal in response to said rollover signal, said antilock brake signal, and said traction control signal, and generating a front and rear active anti-roll bar control signal in response to said rollover signal, said front and rear active anti-roll bar control signal controlling said front and rear active anti-roll bar actuators and said brake actuator signal controlling said brake actuator to prevent the vehicle from rolling over.

19. An automotive vehicle comprising:

an antilock brake controller generating an antilock brake signal;

a traction controller generating a traction control brake signal;

an active anti-roll bar system having a front active anti-roll bar actuator and a rear active anti-roll bar actuator;

a front brake actuator;

a rear brake actuator;

a roll attitude sensing system for producing a rollover signal in response to an impending rollover of the vehicle; and

a rollover controller coupled to said rollover sensor, said active anti-roll bar system, and said front brake actuator and rear brake actuator, said rollover controller

having brake pressure priority logic generating a brake actuator signal in response to said rollover signal, said antilock brake signal, and said traction control brake signal, said controller generating a front and/or rear active anti-roll bar actuator signals in response to said rollover signal, said active anti-roll bar actuator signals controlling said front and/or rear active anti-roll bar actuators and said brake actuator signal controlling said brake actuator to prevent the vehicle from rolling over.

20. An automotive vehicle as recited in claim 19 wherein roll stability control is conducted by sequentially controlling the active anti-roll bar actuators and brake actuators.

21. An automotive vehicle as recited in claim 19 wherein said roll stability controller is conducted by simultaneously controlling the active anti-roll bar actuators and brake actuators so as to achieve a maximum tire lateral force reduction during severe rollovers.

EVIDENCE APPENDIX

No submitted or related evidence.

RELATED PROCEEDINGS APPENDIX

No related proceedings.

PTO/SB/17 (12-04v2)
Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL
For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT	($)	500.00

Complete if Known	
Application Number	10/735,133
Filing Date	December 12, 2003
First Named Inventor	Jianbo Lu
Examiner Name	Yonel Beaulieu
Art Unit	3661
Attorney Docket No.	8109304

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☑ Deposit Account Deposit Account Number: 06-1510 Deposit Account Name: Ford Motor Co.

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☑ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☑ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☑ Credit any overpayments

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

	FILING FEES		SEARCH FEES		EXAMINATION FEES		
		Small Entity		Small Entity		Small Entity	
Application Type	Fee ($)	Fee ($)	Fee ($)	Fee ($)	Fee ($)	Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims		Extra Claims	Fee ($)		Fee Paid ($)
_____	- 20 or HP =	_____	x _____	=	_____

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims		Extra Claims	Fee ($)		Fee Paid ($)
_____	- 3 or HP =	_____	x _____	=	_____

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims	
Fee ($)	Fee Paid ($)
_____	_____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets		Extra Sheets		Number of each additional 50 or fraction thereof	Fee ($)		Fee Paid ($)
_____	- 100 =	_____	/ 50 =	_____ (round up to a whole number)	x _____	=	_____

4. OTHER FEE(S)

	Fees Paid ($)
Non-English Specification, $130 fee (no small entity discount)	
Other (e.g., late filing surcharge): Appeal Brief	500.00

SUBMITTED BY

Signature		Registration No. (Attorney/Agent) 25,824	Telephone 248-223-9500
Name (Print/Type)	John A. Artz		Date November 3, 2006